Danfoss

TURBOCOR

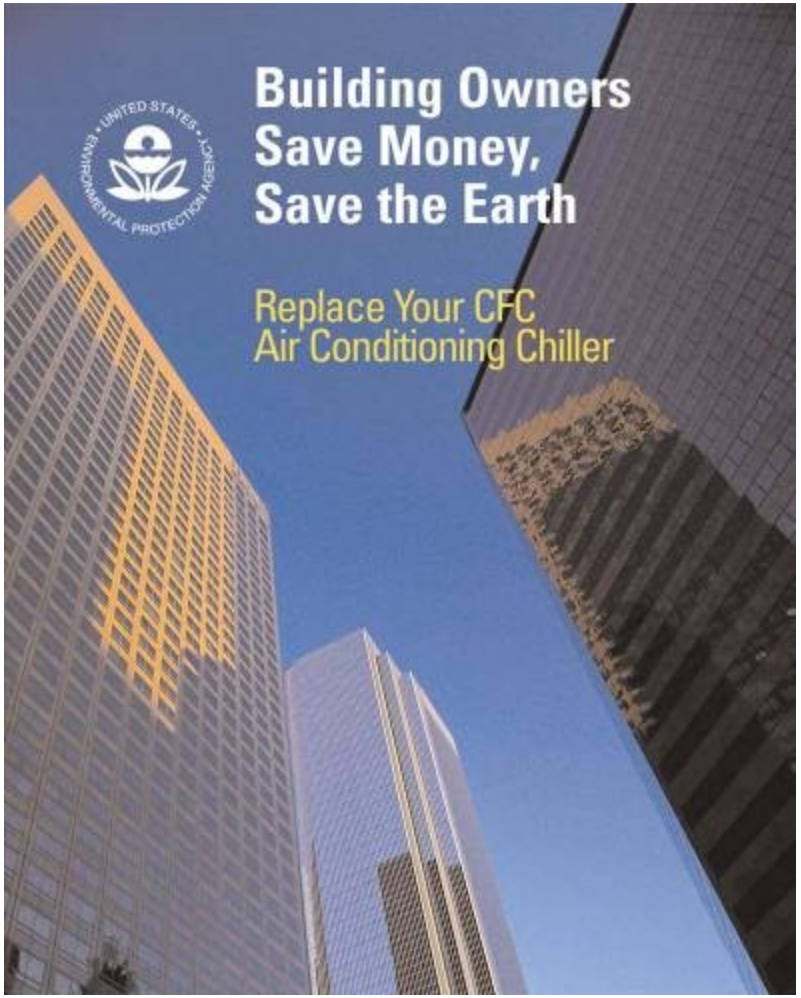
Gene Smithart,
V. P. Sales and Marketing

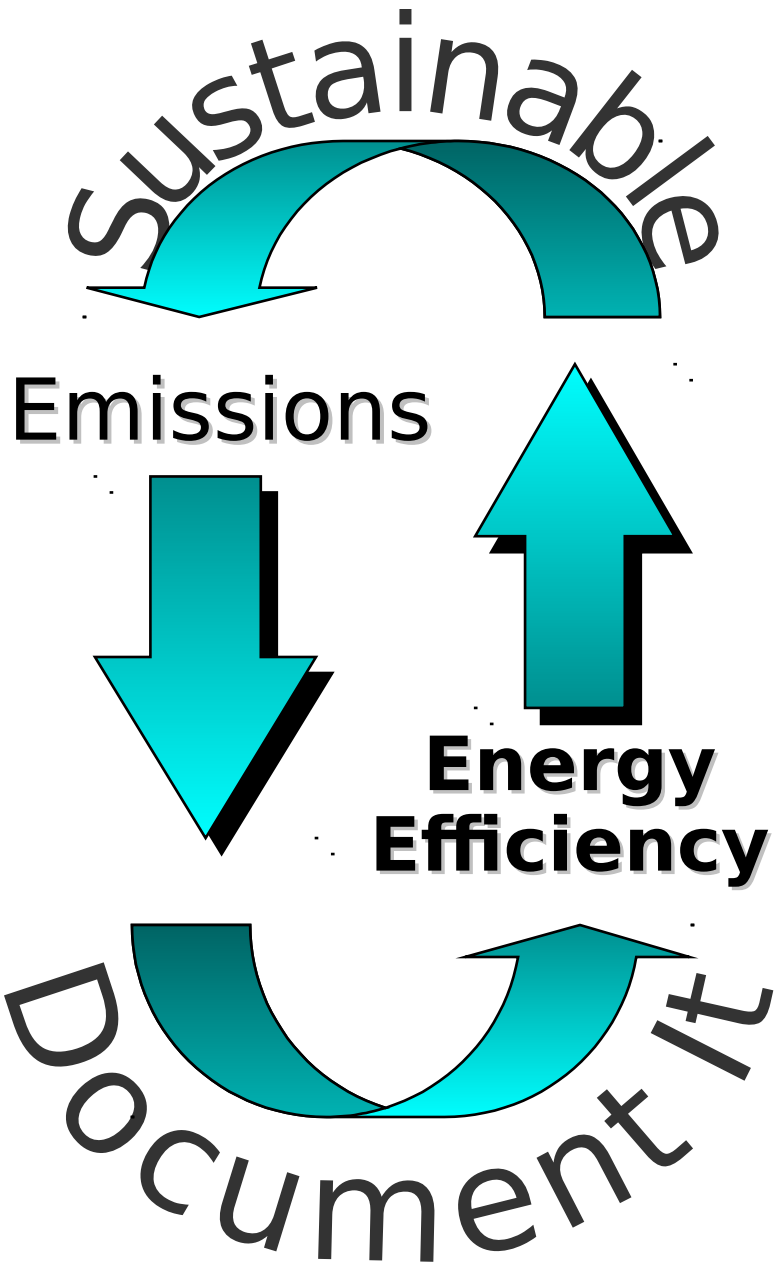
website -- www.turbocor.com

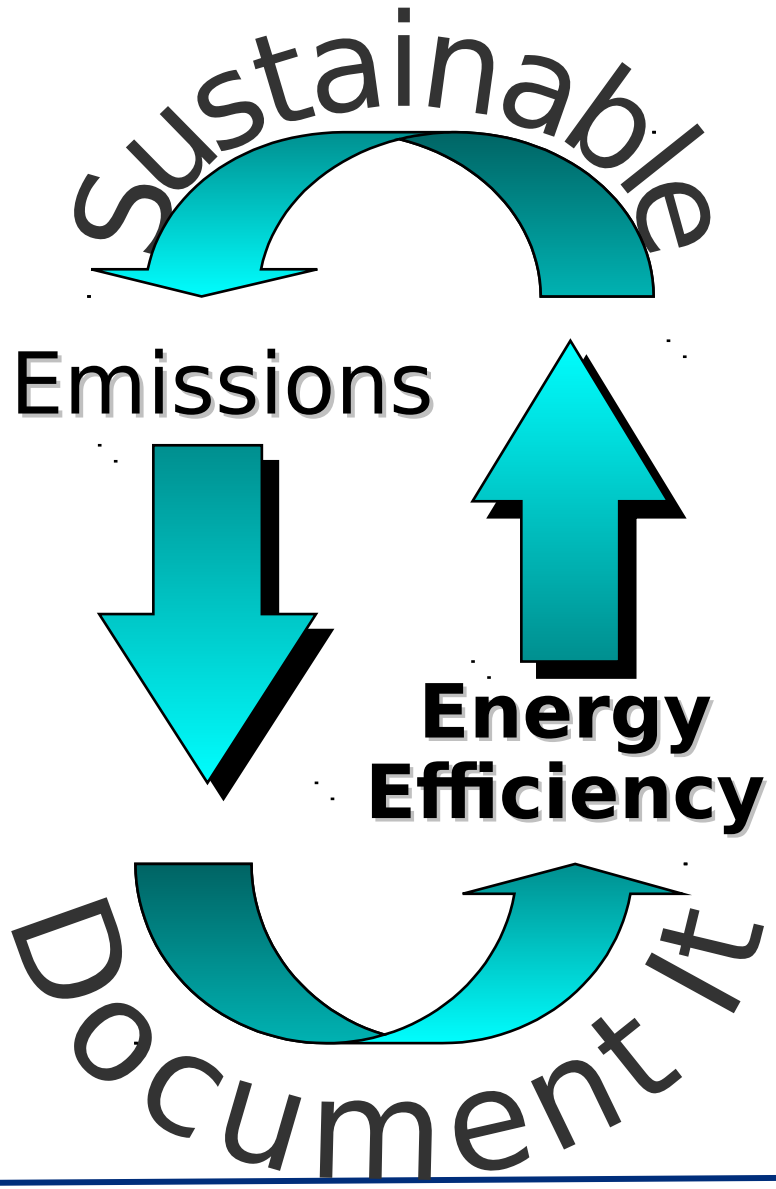
Vision

Danfoss TURBOCOR

U.S. EPA


Building Owners
Save Money,
Save the Earth
Replace Your CFC
Air Conditioning Chiller


Sustainable
Emissions
Energy
Efficiency
Document It



Oil-Free

Best Efficiency

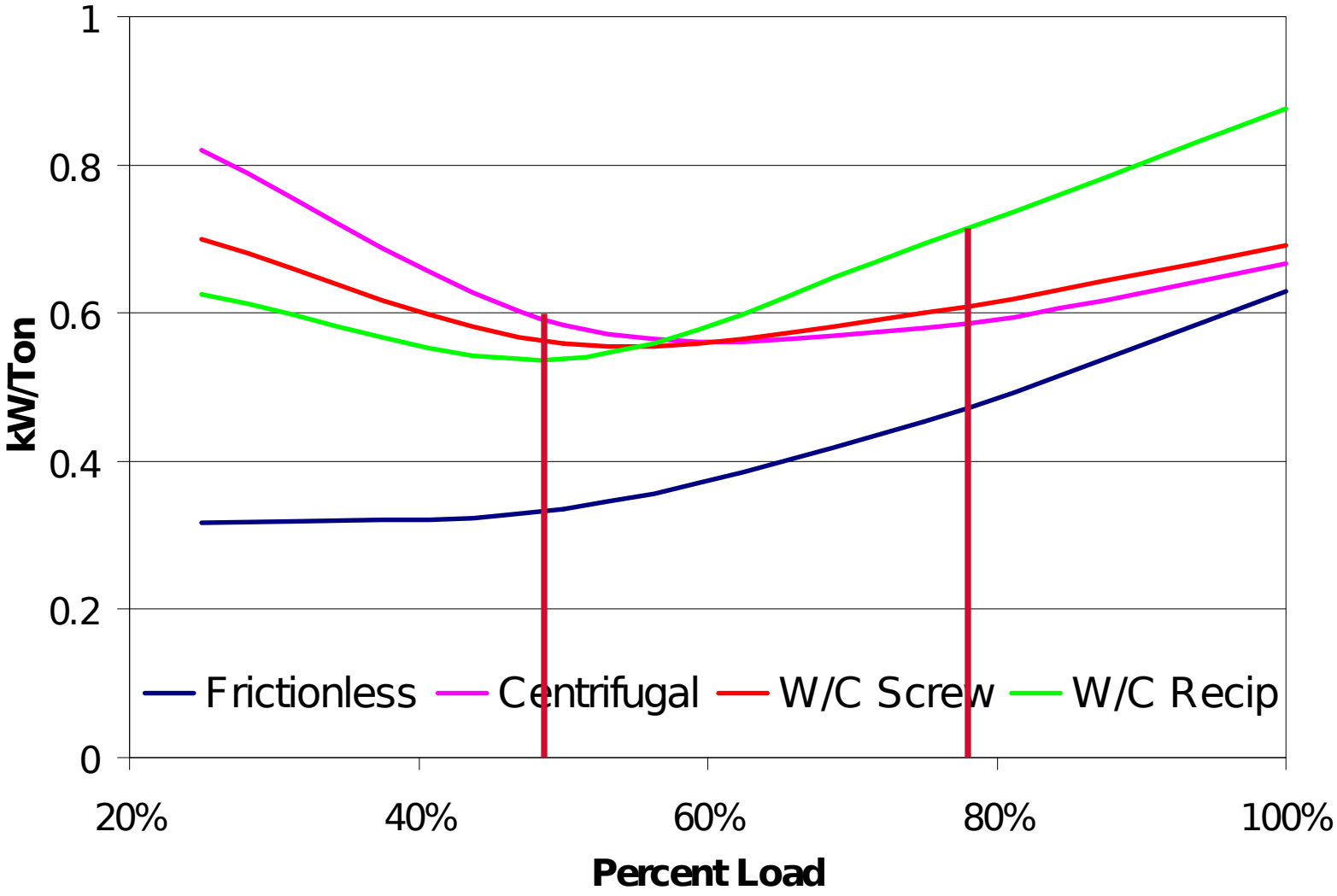
Computer that thinks it's a Compressor

Danfoss TURBOCOR

“EXCITEMENT”

- **33% better operating efficiencies, especially at part load.**

Danfoss TURBOCOR


1
0.8
0.6
0.4
0.2
0
kW/Ton
Frictionless
Centrifugal
W/C Screw
W/C Recip
20%
40%
60%
80%
100%
Percent Load

“EXCITEMENT”

- 33% better operating efficiencies, especially at part load.
- Oil-Free, with maintenance cost 50% less than oiled compressors.
- So quiet, that with typical background noise, you can’t hear it run.
- Only weighs 1/5 that of a typical screw or recip compressor.
- Redefines soft-start, pulling less than 2 amps vs. the 500 to 600 amps of a typical screw.

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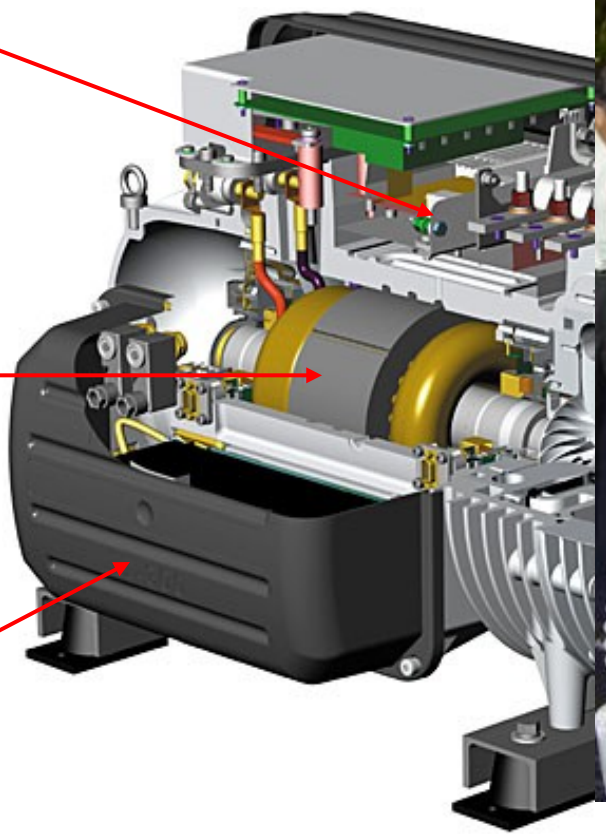
The Turbocor Compressor at a Glance

Inverter speed control

Permanent magnet motor

Motor and bearing control



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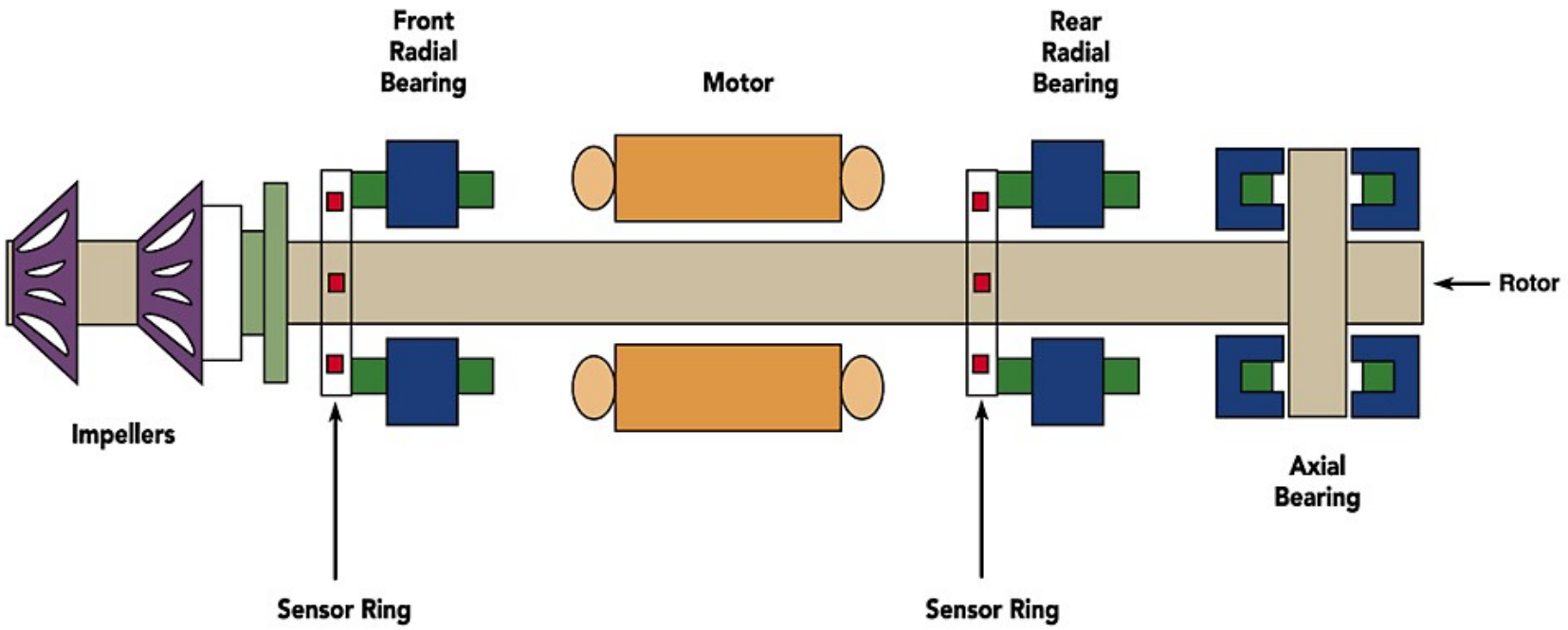
Magnetic Bearing System



Magnetic bearings and sensors keep the shaft properly centered and positioned at all times.

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File Window Layout Advanced Capture Data

Fault Captures

MAP

3 SCREENS

EXIT

TURBOCOR

Ts[sat] 42.4 deg.F Tc[sat] 97.2 deg.F

41.0 kW
3 Phase Power In

83.2 %
Compressor Demand

29867 RPM
Shaft Speed

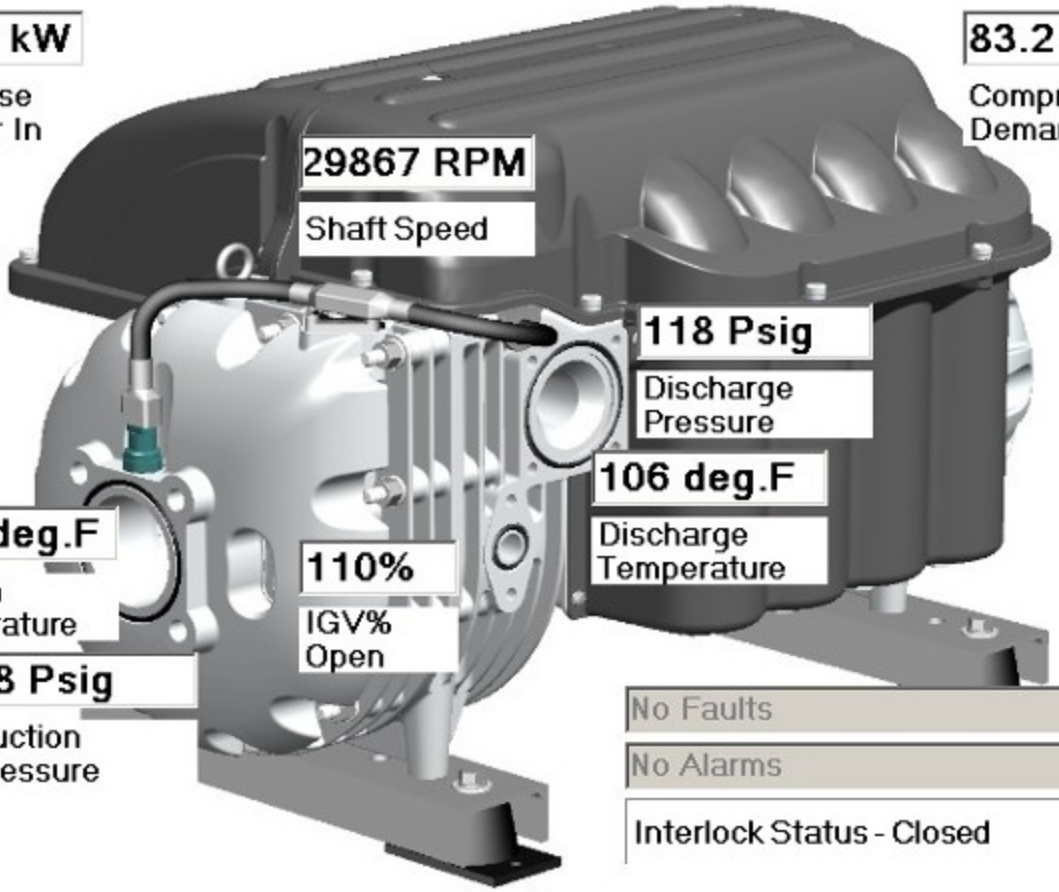
118 Psig
Discharge Pressure

106 deg.F
Discharge Temperature

31.3 deg.F
Suction Temperature

110%
IGV% Open

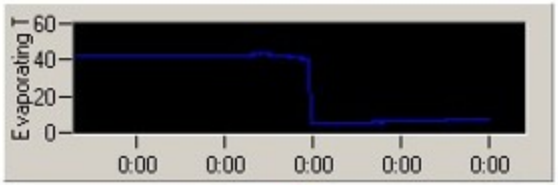
38 Psig
Suction Pressure

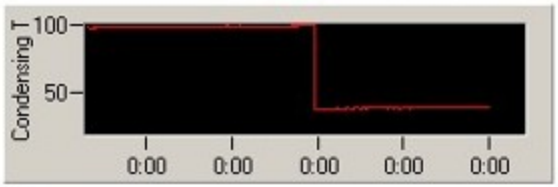


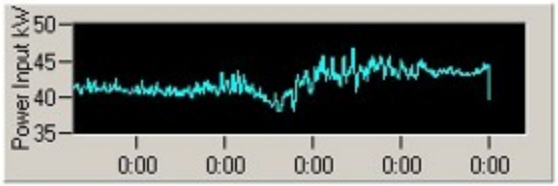
No Faults

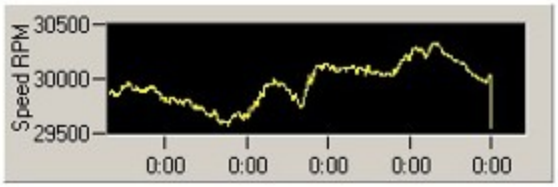
No Alarms

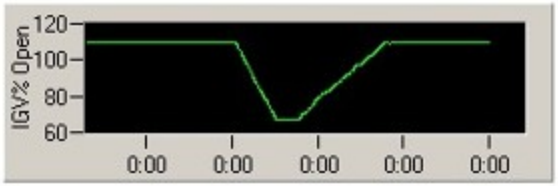
Interlock Status - Closed

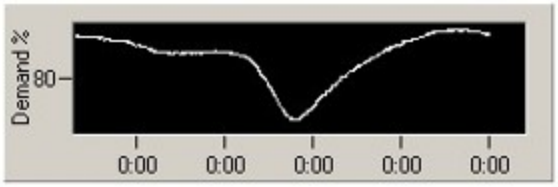












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File Window Layout Advanced Capture Data

Fault Captures

MAP

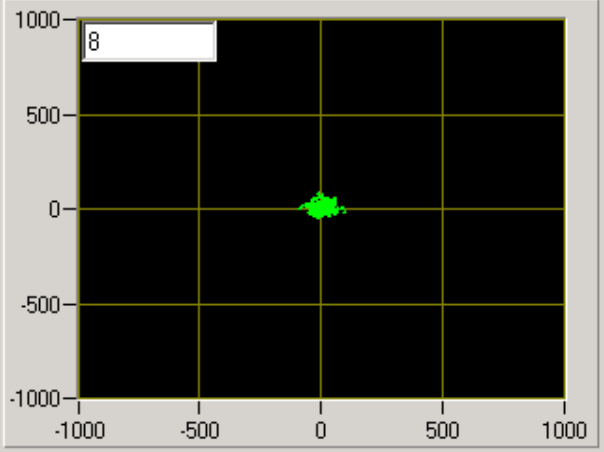
3 SCREENS

EXIT

General Bearing Data

Shaft Levitated	Shaft Levitation State
0.15	Axial Un-Balance %
0.25	Front Radial Un-Balance %
0.15	Rear Radial Un-Balance %
-0.38	Axial Bearing Force [Amps]
-0.04	Front X Bearing Force [Amps]
0.11	Front Y Bearing Force [Amps]
0.17	Rear X Bearing Force [Amps]
0.01	Rear Y Bearing Force [Amps]
0x0000	Fault Code
0x0000	Alarm Code

No Faults.



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File Window Layout Advanced Capture Data

Fault Captures

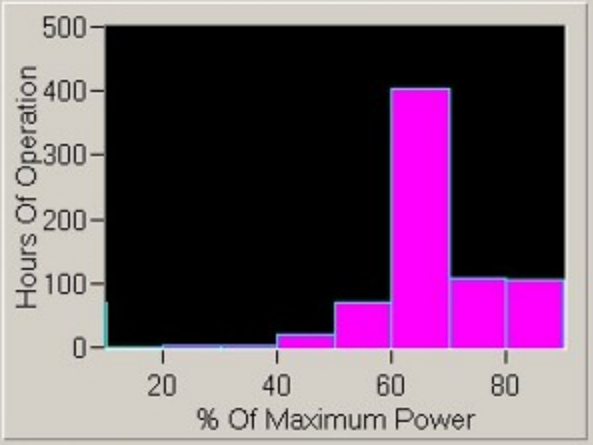
MAP

3 SCREENS

EXIT

Compressor History Data

Load Profile Data %Power Demand Vs Hours



Load Profile Data

69.43	0-10% Operating Time in Hours
0.97	10-20% Operating Time in Hours
2.14	20-30% Operating Time in Hours
2.33	30-40% Operating Time in Hours
20.89	40-50% Operating Time in Hours
70.87	50-60% Operating Time in Hours
403.06	60-70% Operating Time in Hours
106.97	70-80% Operating Time in Hours
105.42	+90% Operating Time in Hours
782.08	Total Time Online
17588 kWh	Total Energy Usage Estimation kWh

Reset Load Profile Data | Reset Energy Usage Data

User Authentication

TURBOCOR MONITOR - Version 2.00.06 - Jan 22 2004 - [General Data Page]

File Window Layout Advanced Capture Data

Fault Captures

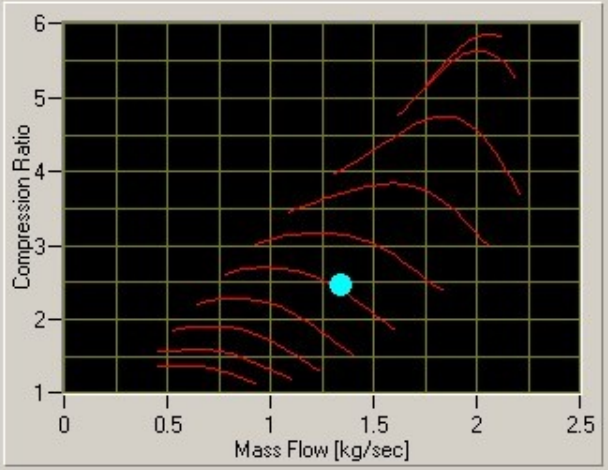
MAP

3 SCREENS

EXIT

Compressor Map

TURBOCOR ONLINE COMPRESSOR MONITOR



29982	Shaft Speed
110.00	Inlet Guide Vane %Opening
37.3	Suction Pressure [psi]
114.9	Discharge Pressure [psi]
35.73	Suction Temperature [deg.F]
0.604	Estimated Mass Flow Rate [lbs/sec]

Turbocor Compressors

Already proven in hundreds of installations with:

- ***Over 3,000,000 hours of field operation***

Danfoss TURBOCOR

Here are just a few:

Danfoss TURBOCOR

University of Ontario Institute of Technology

-Toronto

McQuay
Air Conditioning
gineered for flexibility and performance.™

Axima - Germany

The Sinclair Building
Pasadena, CA

- ***6,400 lbs was replaced with 265 lbs, Two 40 Worthingtons***

  Converted to One Turbocor

  80 Ton VFD 134a

- ***R22 Built up DX system converted to R134a***

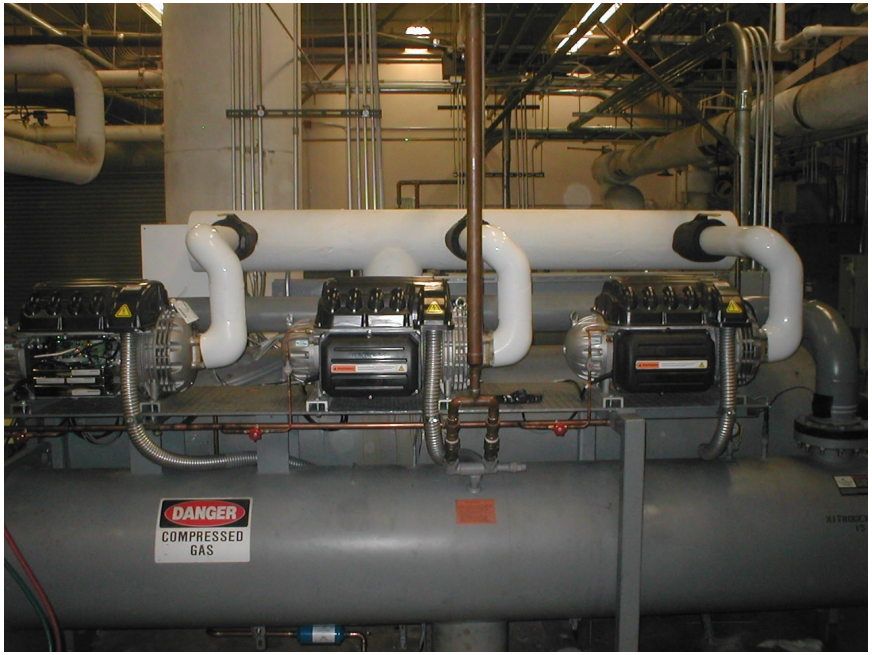
Danfoss TURBOCOR

US Navy – San Diego

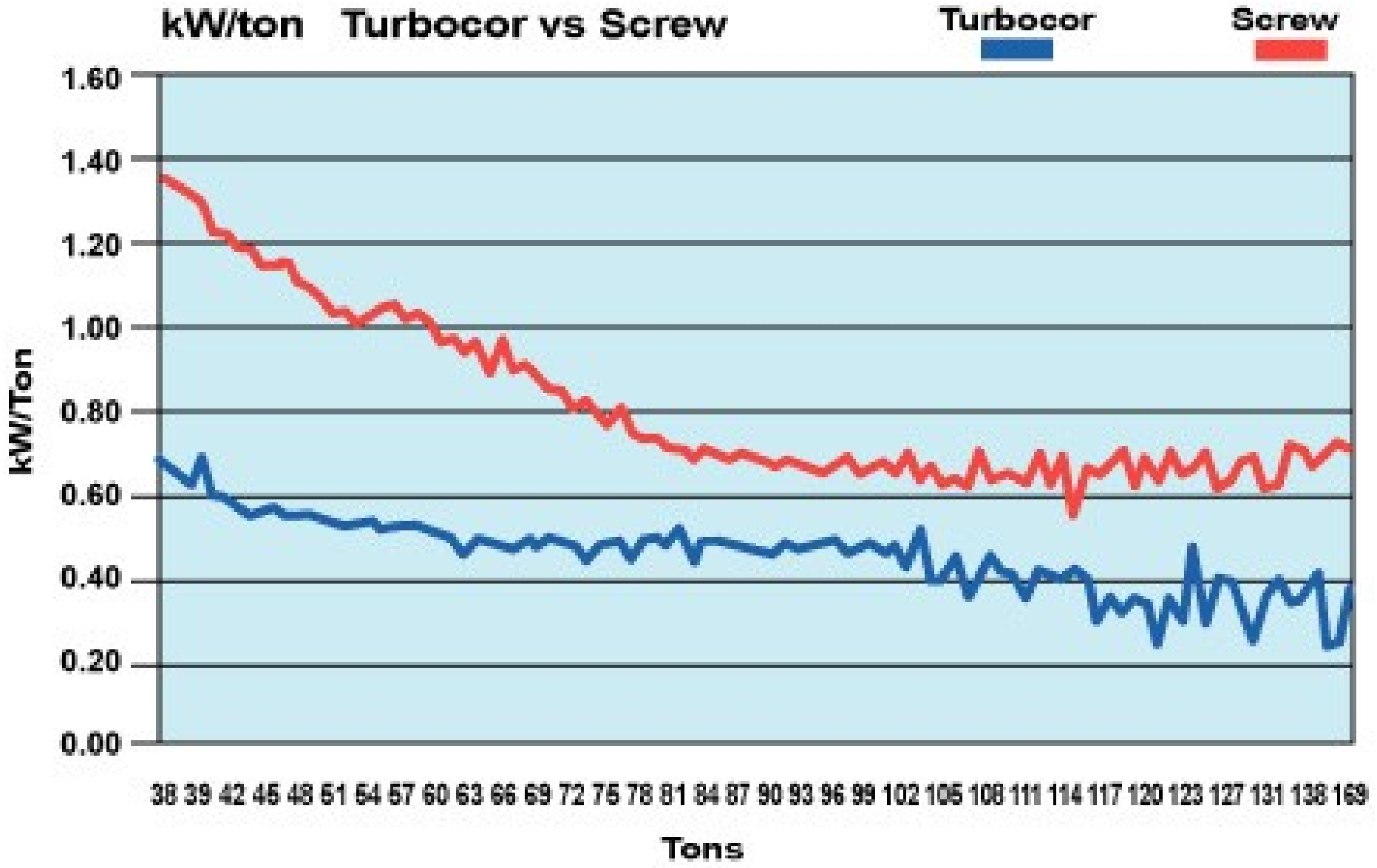
Carrier 23XL screw chiller

Retrofit Conversion to

3 Turbocor VFD



Danfoss TURBOCOR


kW/ton Turbocor vs Screw
Turbocor
Screw
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
kW/Ton
38 39 42 45 48 51 54 57 60 63 66 69 72 75 78 81 84 87 90 93 96 99 102 105 108 111 114 117 120 123 127 131 138 169
Tons

250 Ton R-12 McQuay Centrifugal

Danfoss TURBOCOR

ATTENTION
WARNING

Some Project Facts

- **Project Duration – 10 Days**
- **Field Measured Kw/Ton Pre-Conversion**
  - **.68 Kw/Ton to .90 Kw/Ton**
- **Field Measured Kw/Ton Post-Conversion**
  - **.35 Kw/Ton to .55 Kw/Ton**

Danfoss TURBOCOR

The Future of Compressor Technology!

- **Highest Efficiency***
- **Lowest Emissions**

*Up to 33% more efficient than conventional compressors in its tonnage range.

Plus...

- **Reliable. Only one main rotating part.**
- **Quiet. Sound level less than 70 dBa.**
- **Lightweight. 1/5 the weight of conventional compressors.**
- **2 amp draw start-up.**
- **Oil-Free!**

An integrated compressor design (ICD) utilizing state-of-the-art frictionless, oil-free magnetic bearings and an integral VFD.

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TURBOCOR™